WaterSense® Specification for Weather-Based Irrigation Controllers

Version 1.1

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1.0 Scope and Objective

This specification establishes the criteria for weather-based irrigation controllers labeled under the U.S. Environmental Protection Agency's (EPA's) WaterSense program. It applies to stand-alone controllers, add-on devices, and plug-in devices (collectively referred to in this specification as controllers) that use current weather data as a basis for scheduling irrigation. Based on the American National Standards Institute (ANSI)/American Society of Agricultural and Biological Engineers (ASABE) Standard S627 *Weather-Based Landscape Irrigation Control Systems*,[1] this specification applies to controllers that create or modify irrigation schedules based on evapotranspiration (ET) principles by:

- Storing historical crop evapotranspiration (ETc) data characteristics of the site and modifying these data with an onsite sensor;
- Using onsite weather sensors as a basis for calculating real-time ETc;
- Using a central weather station as a basis for ETc calculations and transmitting the data to individual users from remote sites; or
- Using onsite weather sensors.

For the purpose of this specification, the onsite weather sensor requirement includes weather sensors such as temperature or solar radiation. Because rainfall devices and soil moisture sensors do not modify ETc but interrupt or modify previously scheduled irrigation events based on rainfall or soil moisture readings, they do not meet this onsite weather sensor requirement when used as the sole method for modifying irrigation schedules.

The performance criteria contained in this specification are designed to test the capability of the controller to provide adequate and efficient irrigation while minimizing potential runoff when the controller is programmed and operated in compliance with the manufacturer's instructions. Conformance with these requirements is an indication that the controller has the capacity to modify or generate appropriate irrigation schedules based on weather inputs.

This specification applies to controllers for use in residential or commercial landscape irrigation applications, including controllers that connect to hose bibbs. It does not apply to controllers intended for use exclusively within agricultural irrigation systems.

2.0 Summary of Criteria

Controllers must meet criteria in the following areas, as applicable:

- Irrigation adequacy for each zone shall be greater than or equal to 80 percent as specified in Section 3.0.

[1] References to ANSI/ASABE S627 apply to the most current version this standard.

- Irrigation excess for each zone shall be less than or equal to 10 percent as specified in Section 3.0. The average of the irrigation excess scores calculated across the six zones shall be less than or equal to 5 percent as specified in Section 3.0.
- The controller must conform to the supplemental capability requirements specified in Section 4.0.

3.0 Performance Criteria

The controller, as configured for testing in accordance with Appendix A, shall be tested in accordance with Section 4 (Test Method #1) of ANSI/ASABE S627 and shall meet the performance criteria in Section 3.1 of this specification.

The test period shall be 30 consecutive days. However, the test may run past the initial 30 days until a 30-day period occurs where all conditions in Section 4.6 (Weather Requirements) of ANSI/ASABE S627 are met. The first valid 30-day test period shall be used to calculate irrigation adequacy and irrigation excess, and those values shall be compared to the criteria in Section 3.1 to determine if the product passes the test.[2]

3.1 Performance Requirements

3.1.1 Irrigation adequacy, as calculated in accordance with Table 4 in ANSI/ASABE S627, shall be greater than or equal to 80 percent for each zone.

3.1.2 Irrigation excess, as calculated in accordance with Table 4 in ANSI/ASABE S627, shall be less than or equal to 10 percent for each zone. The average of the irrigation excess scores calculated across the six zones shall be less than or equal to 5 percent.

4.0 Supplemental Capability Requirements

The controller, as configured for testing in accordance with Appendix A, shall have the following supplemental capabilities in both weather-based mode and standard mode:

4.1 Be capable of preserving the contents of the programmed irrigation settings when the power source is lost and without relying on an external battery backup.

4.2 Either be capable of independent, zone-specific programming or storing a minimum of three different programs to allow for separate schedules for zones with differing water needs.

4.3 Be capable of indicating to the user when it is not receiving a signal or local sensor input and is not adjusting irrigation based on current weather conditions.

[2] ANSI/ASABE S627 implies the test may run longer than 30 days, but WaterSense is clarifying the test period shall be no more than 30 days and shall be the first 30-day period in which the weather requirements are met.

4.4 Be capable of interfacing with a rainfall device or soil moisture sensor.

4.5 Be capable of accommodating watering restrictions as follows:
- 4.5.1 Operation on a prescribed day(s)-of-week schedule (e.g., Monday-Wednesday-Friday, Tuesday-Thursday-Saturday; any two days; any single day).
- 4.5.2 Either even day or odd day scheduling, or any day interval scheduling between two and seven days.
- 4.5.3 The ability to set irrigation runtimes to avoid watering during a prohibited time of day (e.g., between 9:00 a.m. and 9:00 p.m.).
- 4.5.4 Complete shutoff (e.g., on/off switch) to accommodate outdoor irrigation prohibition restrictions.

4.6 Include a percent adjust (water budget) feature.[3]

4.7 Be capable of reverting to either a proxy of historical weather data or a percent adjust (water budget) feature if the primary source of weather information is lost.

4.8 Be capable of allowing for a manual operation troubleshooting test cycle and automatically return to weather-based mode within some period of time as designated by the manufacturer.

5.0 Packaging and Product Documentation Requirements

Controllers shall be packaged and provided with documentation as indicated in this section.

5.1 General: Applies to Stand-Alone, Add-on Devices, and Plug-in Devices

The product, as packaged, shall include the same components (excluding the base controller for add-on or plug-in devices) or attributes that it was tested with to meet the requirements of this specification. For controllers with weather stations, sensors, or rainfall devices, all components tested with the controller must be packaged with the controller. For signal-based controllers, instructions on acquiring the proper weather signal shall be packaged with the controller.

The product packaging shall include an instruction manual that lists the settings and specific parts used during the performance test described in Section 3.0. The instruction manual shall also include the maximum number of stations for the product.

The product shall not be packaged nor marked to encourage operation of the controller in standard mode. Any instruction related to the maintenance of the product shall direct the user how to return the controller to weather-based mode.

5.2 Add-on and Plug-in Devices

[3] The percent adjust (water budget) feature is defined as having the means to increase or decrease the runtimes or application rates for zones by means of one adjustment without modifying the settings for each individual zone.

Add-on and plug-in devices are not required to be packaged with the base controller(s) with which they were tested or have been determined to be compatible with, as specified in Appendix A. However, the product documentation for the add-on and plug-in devices must list (or provide access to a list of) each compatible base controller model. The documentation must also contain a statement to the effect that the device is only WaterSense labeled when used in combination with a base controller on the provided compatibility list.

6.0 Effective Date

This specification is effective as of September 2, 2021.

7.0 Future Specification Revisions

EPA reserves the right to revise this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. Major revisions to the specification shall be made following input from industry partners and other interested stakeholders.

8.0 Definitions

Definitions within ANSI/ASABE S627 are included by reference.

Add-on device: A weather-based irrigation controller that communicates with a base controller and uses current weather data as a basis for controlling the irrigation schedule. For purposes of this specification, add-on devices are defined as those that are designed to work with multiple brands of base controllers.

Base controller: The irrigation controller with which an add-on or plug-in device communicates for full operation.

Plug-in device: A weather-based irrigation controller that communicates with a base controller and uses current weather data as a basis for controlling the irrigation schedule. For purposes of this specification, plug-in devices are defined as those that are designed to work specifically with one brand of base controller.

Rainfall device: A device that either senses or measures rainfall to reduce or interrupt irrigation in response to rain events. For the purpose of this specification, this includes, but is not limited to, rainfall interrupt devices and tipping bucket rain gauges.

Reference weather station: The weather station utilized by the licensed certifying body that produces the reference weather data used during the performance test.

Soil moisture sensor: A sensor mechanism and interface device that enables (allows) or disables (prevents/interrupts) an irrigation event at preset or selected soil water values.

Stand-alone controller: A weather-based irrigation controller for which weather-based control is an integrated capability. This includes a single controlling device (i.e., the irrigation controller) and all of the sensors and/or weather service(s) that provide the weather data.

Standard mode: The operating mode in which the controller is not using weather data to schedule irrigation or modify the irrigation schedule (i.e., when a weather-based controller is not in weather-based mode).

Weather-based mode: The operating mode in which the stand-alone controller (or plug-in or add-on device and associated base controller) is using weather data to schedule irrigation or modify the irrigation schedule.

APPENDIX A: Testing Configuration, Programming, and Compatible Base Controller Determination

Controllers shall be configured for testing in accordance with the relevant sections below.

1.0 General: Applies to Stand-Alone, Add-on Devices, and Plug-in Devices

The controller shall be tested with all weather stations, sensors, rainfall devices, or service(s) required to meet this specification.

The controller shall be programmed according to the list of settings provided by the manufacturer in the product's instruction manual described in Section 5.1 of this specification. Manufacturers shall have no interaction with the product during testing, including programming of the controller during setup or for the duration of the test.

Licensed certifying bodies shall not make any special accommodations during testing for the controller to select the reference weather station as its data source. The test report shall include the name and address of the reference weather station.

2.0 Add-on and Plug-in Devices

2.1 Initial Configuration for Testing

The manufacturer shall specify a base controller model with which the add-on or plug-in device shall be tested. Together, the unit shall be capable of meeting the requirements of this specification, including the supplemental capability requirements specified in Section 4.0.

2.2 Determining Additional Compatible Base Controllers

At the discretion of the licensed certifying body (LCB), additional base controller models with which the add-on or plug-in device can be paired, and that together as a unit meet the requirements of this specification, including the supplemental capability requirements specified in Section 4.0, can be identified and listed as compatible base controllers according to Section 5.2 of this specification and labeled in accordance with Section 3 of Appendix B. See the *Supplemental Guidance for WaterSense Certification and Labeling of Irrigation Controllers* and the *WaterSense Product Certification System* for more information.

3.0 Controllers With Fewer Than Six Stations

For controllers that offer fewer than six stations, multiple products shall be tested simultaneously to cover the six zone programming requirements required in ANSI/ASABE S627. For example, two products capable of controlling three irrigation zones each must be programmed together to meet the six-zone requirement.

APPENDIX B: Informative Annex for WaterSense Labeling

The following requirements must be met for products to earn the WaterSense label.

1.0 WaterSense Partnership

The manufacturer of a controller must have a signed partnership agreement in place with EPA. Manufacturers of components, such as weather stations, additional sensors, or weather services are not eligible for partnership on that basis alone.

2.0 Conformity Assessment

Conformance to this specification must be certified by a licensed certifying body accredited in accordance with the *WaterSense Product Certification System*.

3.0 WaterSense Labeling

3.1 The label shall be applied to product packaging that includes the certified controller and all components (excluding the base controller for add-on and plug-in devices) or attributes with which the controller was tested to meet the requirements of this specification.

3.2 For add-on and plug-in devices, only the devices certified to meet the requirements of this specification may bear the WaterSense label. Base controllers with which the add-on or plug-in devices are tested and/or determined to be compatible shall not bear the WaterSense label. Product documentation shall indicate that the add-on or plug-in device is only WaterSense labeled when used in combination with the base controller(s) listed in product documentation described in Section 5.0 of this specification.

3.3 Base controllers that are tested, or determined to be compatible with an add-on or plug-in device, may bear the WaterSense promotional label and include language similar to “Look for the WaterSense labeled [plug-in or add-on device] to improve the water efficiency capabilities of this controller.” See the *WaterSense Program Mark Guidelines* for more information about the use of the WaterSense promotional label.

3.4 Products (i.e., stand-alone controllers, plug-in and add-on devices) that are packaged and sold as a single unit and integrate weather-based scheduling (i.e., the use of current weather data as a basis for scheduling irrigation) and soil moisture-based scheduling (i.e. an allowance or prevention of an irrigation event based on readings from a soil moisture mechanism) shall be certified to meet the requirements of this *WaterSense Specification for Weather-Based Irrigation Controllers* and the *WaterSense Specification for Soil-Moisture Based Irrigation Controllers* in order for the product to earn the WaterSense label.

4.0 Product Sampling for Certification

Products shall be sampled in accordance with sample selection requirements described in the *WaterSense Product Certification System* and Section 4.1 of ANSI/ASABE S627.